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# Social Psychological Aspects of Computer-Mediated Communication

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**ABSTRACT:** *As more and more people use computers for communicating, the behavioral and societal effects of computer-mediated communication are becoming critical research topics. This article describes some of the issues raised by electronic communication, illustrates one empirical approach for investigating its social psychological effects, and discusses why social psychological research might contribute to a deeper understanding of computer-mediated communication specifically and of computers and technological change in society more generally. One objective of our research is to explore how people participate in computer-mediated communication and how computerization affects group efforts to reach consensus. In experiments, we have shown differences in participation, decisions, and interaction among groups meeting face to face and in simultaneous computer-linked discourse and communication by electronic mail. We discuss these results and the design of subsequent research to highlight the many researchable social psychological issues raised by computing and technological change.*

Computer technologies are improving so swiftly these days that few of us comprehend even a small part of the change. Computers are transforming work and, in some cases, lives. Whether eager for this or resistant, many people believe the organizational, social, and personal effects of computers will be deeply felt (De Sola Poole, 1977; Hiltz & Turoff, 1978; Kling, 1980).

Today, no one can predict in any detail the nature of the transformations that computers will bring, but one aspect of life that will certainly be affected is communication. The use of electronic mail and messages, long-distance blackboards, computer bulletin boards, instantaneously transferable data banks, and simultaneous computer conferences is reportedly advancing "like an avalanche" (Stockton, 1981; also see Kraemer, 1981). The U.S. federal judiciary, for example, is using electronic mail to speed the circulation of appellate opinion drafts among panels of judges (Weis, 1983). Computer conferences are being used for such legal proceedings

as admission of evidence, trial scheduling, giving parties access to documents, and expert interrogation (Bentz & Potrykus, 1976; "Party-Line Plea," 1981). Other government agencies, such as the Department of Defense, as well as private firms, such as Westinghouse Corporation and Xerox Corporation, and some universities, use computer-mediated communication extensively for both routine transfer of data and nonroutine interpersonal communication and project work (e.g., Licklider & Vezza, 1978; U.S. Department of Commerce, 1977; Wang Corporation, 1982).

Computer-mediated communication was once confined to technical users and was considered somewhat arcane. This no longer holds true. Computer-mediated communication is a key component of the emerging technology of computer networks. In networks, people can exchange, store, edit, broadcast, and copy any written document. They can send data and messages instantaneously, easily, at low cost, and over long distances. Two or more people can look at a document and revise it together, consult with each other on critical matters without meeting together or setting up a telephone conference, or ask for and give assistance interactively (Hiltz & Turoff, 1978; Williams, 1977).

Networks, and hence computer-mediated communications, are proliferating at a tremendous rate. In addition to the older long-distance networks that connect thousands of scientists, professionals, and managers (e.g., the Department of Defense's ARPANET, GTE's TELENET), there are more and more local-area networks that link up computers within a region, city, or organization (e.g., Nestar System's CLUSTERBUS, Xerox's ETHERNET, Ford Aerospace's FLASHNET, and Wang Laboratories' WANGNET). Stimulating this growth are the decreasing costs and the advantages of networks over stand-alone systems, such as sharing high-speed printers and access to a common interface for otherwise incompatible equipment. The future of this technology cannot be foretold, but it is far from arcane.

The functions and impact of computer-mediated communication are still poorly understood. Critical information (such as who uses it for what purposes)

is lacking, and the social psychological significance is controversial (see, e.g., Turoff, 1982). Computers could make communication easier, just as the canning of perishables and the development of can openers made food preparation easier, or they could have much more complex implications. For instance, access to electronic communication may change the flow of information within organizations, altering status relations and organizational hierarchy. When a manager can receive electronic mail from 10,000 employees, what happens to existing controls over participation and information? When people can publish and distribute their own electronic newspaper at no cost, does the distribution of power change too? When communication is rapid and purely textual, do working groups find it easier or harder to resolve conflict? These unanswered questions illustrate that, although the technology may be impressive, little systematic research exists on its psychological, social, and cultural significance. Given such conditions it seems sensible to try to understand the fundamental behavioral, social, and organizational processes that surround computer-mediated communication. We believe that ideas and approaches from social psychology and other areas of behavioral science can be applied to these questions.

This article is meant to describe some of the issues raised by electronic communication; to illustrate, from our own work, one empirical approach for investigating them; and to show why social psychological research might contribute to a deeper understanding of electronic communication specifically and of computers and technological change in society more generally. We begin by citing some existing research on computer-mediated communication. Most of this research addresses the technical capabilities of the electronic technologies. Next, we consider the possible social psychological impact, and we discuss some hypotheses and some possible implications for the outcomes of communication. Finally, we describe some of our own experiments on social psychological aspects of computer-mediated communication, using these to indicate potential lines of future research.

## Existing Research

With a few pioneering exceptions (Hiltz, Johnson, Aronovitch, & Turoff, 1980; Hiltz, Johnson, & Tur-

off, 1982; Kling, 1982; Short, Williams, & Christie, 1976), research on and analyses of computer communication technologies evaluate the efficiency of these technologies based on their cost and technical capabilities (Bikson, Gutek, & Mankin, 1981). Representative of this orientation are discussions of how computer communications can work in organizations such as libraries and engineering firms (e.g., Lancaster, 1978; Tapscott, 1982); surveys of the introduction of computer networks in organizations (e.g., Rice & Case, 1982; Sinaiko, 1963); and also experimental studies comparing the effects of various communication channels (Chapanis, 1972; Geller, 1981; Kite & Vitz, 1966; Krueger, 1976; Morley & Stephenson, 1969; Weeks & Chapanis, 1976; Williams, 1973a, 1973b, 1975a, 1975b). In general, research on the technical capabilities of computers has addressed questions about how particular technical, economic, or ergonomic characteristics of the technology are related to organizational efficiency and effectiveness. The instantaneous information exchange provided by electronic mail, for example, might allow people to work without regard for their geographic dispersion, their schedules, time zones, access to secretaries, and energy costs (Kraemer, 1981). If computer mail discourages chatting and off-task interaction (Weeks & Chapanis, 1976) or if people read more effectively than they listen (Hiltz & Turoff, 1978), then managers might be more efficient.

The approach based on technical capability is a common and convenient means of analyzing new technologies. However, in real life, technological functions do not exist in isolation. Each technical component may be part of a larger context or may trigger certain social psychological processes (Pye & Williams, 1977; Williams, 1977). Thus, for instance, a broadly accessible communication network might not only increase total communication rates but also stimulate communication up and down the organization. If supervisors find it easy to keep tabs on subordinates and subordinates "copy up" to superiors, centralization of control might increase even while communication becomes more participative.

The prospect of enhanced or changed flows of information among people raises many other social psychological issues. For example, managers who use computer conferences to look at and discuss on-line computerized forecasts and analyses (Dutton & Kraemer, 1980) might persuade each other too readily. On the other hand, there are various computer-aided decision-making techniques, such as Delphi, that are designed to increase decision quality by removing status and other social cues (Martino, 1972; Price, 1975). It is conceivable that by providing groups with more

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"hard" information, computers would reduce the probability of "groupthink" (Janis, 1972) or "tunnel vision" (Hedberg, Nystrom, & Starbuck, 1976) in group decision making (Krueger, 1976; Vallee, Johansen, Lipinski, & Wilson, 1977).

As these speculations suggest, a focused effort on the psychological and social aspects of computing environments revealed by technical capability studies (but not pursued in these studies) is needed. In the new research efforts, social psychologists and other social scientists would use the wealth of theory and previous research in their fields to generate hypotheses about computing and to evaluate these hypotheses empirically. This would mean studying the implications of the social features of computing, not just its technical characteristics. We expand on this notion next.

### **Social Psychological Aspects of Computer-Mediated Communication**

Computer-mediated communication differs in many ways, both technically and culturally, from more traditional communication technologies. Technically, it has the speed (including simultaneity, if desired) and energy efficiency, but not the aural or visual feedback of telephoning and face-to-face communication. It has the adaptability of written text. Messages can be sent to groups of any size and can be programmed for such special functions as automatic copying to a prespecified distribution list. Culturally, computer-mediated communication is still undeveloped. Although computer professionals have used electronic communication for over two decades, and they make up a subculture whose norms influence computer users and electronic communication (Sproull, Kiesler, & Zubrow, in press), no strong etiquette as yet applies to how electronic communication should be used. A few user manuals devote a paragraph to appropriate uses of a computer network, but generally speaking, people do not receive either formal or informal instruction in an etiquette of electronic communication. These technical and cultural issues might be organized around the following questions.

#### ***Time and Information Processing Pressures***

Does easy, rapid communication—messages exchanged literally at the touch of a key—change the quantity or the distribution or the timing of information exchanged? Availability of instantaneous electronic communication, for example, might lead people to expect immediate responses. (We have talked with a company president in Pittsburgh who sends computer mail at dinnertime asking his subordinates in Singapore for quarterly projections by breakfast.)

#### ***Absence of Regulating Feedback***

Does communication through text alone reduce coordination of communication? In traditional forms of communication, head nods, smiles, eye contact, distance, tone of voice, and other nonverbal behavior give speakers and listeners information they can use to regulate, modify, and control exchanges. Electronic communication may be inefficient for resolving such coordination problems as telling another person you already have knowledge of something he or she is explaining (Kraut, Lewis, & Swezey, 1982).

#### ***Dramaturgical Weakness***

Computer communication might weaken social influence by the absence of such nonverbal behavior as taking the head seat, speaking loudly, staring, touching, and gesturing (R. Kling, personal communication, May, 1983). The opportunity to hear someone's voice or to look him or her in the eye changes how bargains are negotiated or whether any real bargaining occurs (e.g., Carnevale, Pruitt, & Seilheimer, 1981; Krauss, Apple, Morencz, Wenzel, & Winton, 1981). When using computers to communicate, how will people compensate for the dramaturgical weakness of electronic media? For example, Hiltz and Turoff reported that computer conferees have developed ways of sending computerized screams, hugs, and kisses (in Pollack, 1982, p. D2).

#### ***Few Status and Position Cues***

Software for electronic communication is blind with respect to the vertical hierarchy in social relationships and organizations. Once people have electronic access, their status, power, and prestige are communicated neither contextually (the way secretaries and meeting rooms and clothes communicate) nor dynamically (the way gaze, touch, and facial and paralinguistic behavior communicate; Edinger & Patterson, 1983). Thus charismatic and high status people may have less influence, and group members may participate more equally in computer communication.

#### ***Social Anonymity***

Is electronic communication depersonalizing? Because it uses printed text, without even the texture of paper to lend it individuality, electronic communication tends to seem impersonal. Communicators must imagine their audience, for at a terminal it almost seems as though the computer itself is the audience. Messages are depersonalized, inviting stronger or more uninhibited text and more assertiveness in return. It might be especially hard to communicate liking or intimacy without writing unusually positive text. (At our university, a computer manual warns, "Sometimes . . . users lose sight of

the fact that they are really addressing other people, not the computer.”)

### ***Computing Norms and Immature Etiquette***

Because electronic communication was developed and has been used by a distinctive subculture of computing professionals, its norms are infused with that culture's special language (i.e., people talk about “default” attitudes and “bogus” assertions) and its implicit rejection of organizational conventionality and 8-hour workdays. In our own university as well as other organizations (Sheil, personal communication, April 1982), people using electronic mail overstep conventional time boundaries dividing office and home; they mix work and personal communications; they use language appropriate for boardrooms and ballfields interchangeably; and they disregard normal conventions of privacy (for instance, by posting personal messages to general bulletin boards). This behavior is not counteracted by established conventions or etiquette for computer communication. There are few shared standards for salutations, for structuring formal versus informal messages, or for adapting content to achieve both impact and politeness. How do people develop a communication network social structure using a technology in cultural transition? Do they import norms from other technologies? Do they develop new norms?

From a social psychological perspective, this list of questions suggests that computer-mediated communication has at least two interesting characteristics: (a) a paucity of social context information and (b) few widely shared norms governing its use. These characteristics may affect communication via computer in at least three areas. First, the lack of social feedback and unpredictable style of messages might make it difficult to coordinate and comprehend messages (Kraut & Lewis, in press). Second, social influence among communicators might become more equal because so much hierarchical dominance and power information is hidden (Edinger & Patterson, 1983). Third, social standards will be less important and communication will be more impersonal and more free because the rapid exchange of text, the lack of social feedback, and the absence of norms governing the social interaction redirect attention away from others and toward the message itself. Indeed, computer-mediated communication seems to comprise some of the same conditions that are important for deindividuation— anonymity, reduced self-regulation, and reduced self-awareness (e.g., Diener, 1980; Festinger, Pepitone, & Newcomb, 1952; Forsyth, 1983, pp. 308–338).

This last point deserves some elaboration. Using traditional communication, norms, social standards, and inferences about individuals are made salient

by observable social structural artifacts (such as prestige communicated through a person's dress or letterhead) and by communication itself, including nonverbal involvement (Edinger & Patterson, 1983; Patterson, 1982). However, terminals and electronic signals convey fewer historical, contextual, and nonverbal cues. Electronic media do not efficiently communicate nuances of meaning and frame of mind, organizational loyalties, symbolic procedural variations, and, especially, individuating details about people that might be embodied in their dress, location, demeanor, and expressiveness (e.g., Ekman, Friesen, O'Sullivan, & Scherer, 1980; Mehrabian, 1972). This situation, where personality and culture lack salience, might foster feelings of depersonalization. In addition, using the computer tends to be absorbing and conducive to quick response, which might reduce self-awareness and increase the feeling of being submerged in the machine. Thus, the overall weakening of self- or normative regulation might be similar to what happens when people become less self-aware and submerged in a group, that is, deindividuated (Diener, Lusk, DeFour, & Flax, 1980; Scheier, 1976; Scheier & Carver, 1977; Scheier, Carver, & Gibbons, 1981).

### **Outcomes of Technology Use**

Most existing discussions of computers focus on the advantages of computer-mediated communication for work: fast and precise information exchange, increased participation in problem solving and decision making, and reduction of “irrelevant” status and prestige differences (Lancaster, 1978; Linstone & Turoff, 1975; Martino, 1972). This orientation is illustrated by the following:

The scientific literature will become unified. . . . Scientists everywhere will have equal access . . . the advantage of being in a famous center of research will be substantially lessened. Scientists in obscure universities . . . will be able to participate in scientific discourse more readily. (Folk, 1977, p. 80)

Existing social psychological studies do not entirely contradict the forecasts that communicating by computer will increase participation, objectivity, and efficiency of groups and organizations. For example, any communication technology that reduces the importance of status and dominance could increase the likelihood that opinions in groups are sampled more widely. If people who are high in status usually talk most and dominate decision making (Hoffman, 1978), then computer-mediated communication that deemphasizes the impact of status also might increase people's consideration of minority views. If minority opinions can enhance performance, then groups could be more effective when using computers to communicate.

On the other hand, equal participation, objectivity, and efficiency sometimes interfere with important group outcomes. To be effective, rather than encouraging equal participation, group members may need to organize themselves by discovering sources of information, deciding who can be depended on, distributing work to these people, and protecting their autonomy (e.g., Hackman & Morris, 1978). To be effective, rather than aiming at objectivity, groups may need affective bonds, a status distribution that helps sort out multiple objectives, and a hierarchy that determines influence, even if these behaviors interfere with "good" decisions (Kelley & Thibaut, 1978; March & Olsen, 1976; Salancik, 1977). For accomplishing these purposes, the social structure provided by roles, norms, and status and reinforced by trust and personal engagement with others is critical.

These ideas suggest that the use of computers for communication will be more complex than is typically envisioned in the computer technology literature. We have speculated that computer-mediated communication will influence group functions involving coordination of discussion, participation and influence of dominant individuals, and normative control. In technical problem solving, then, computer-mediated groups might be disorganized, democratic, unrestrained, and perhaps more creative than groups communicating more traditionally; they might have trouble reaching consensus if the "correct" answer is not obvious; they might not operate as cool, fast decision makers. What might be the outcome for real groups that have to deal with technical, political, and organizational tasks? Ultimately, it might depend on existing relationships. In computer-linked groups whose members are discontented and in conflict with one another, impersonal behavior might tend to polarize members, exacerbate aggressiveness, and cause negative attributions to others (e.g., Gibbons & Wright, 1981; Goldstein, Davis, & Herman, 1975; McArthur & Solomon, 1978; Prentice-Dunn & Rogers, 1980). However, in computer-linked groups that are on friendly, cooperative terms, impersonal behavior might actually encourage joint approaches to decision making or negotiating (see Druckman, 1977; Pruitt & Lewis, 1975), and it could reduce self-consciousness and promote intimacy. Some of our colleagues, for example, notice that their students are more often willing to approach a professor for assistance with assignments or a potential date through electronic mail than in face-to-face encounters (Larkin, personal communication, July 1982; Welsch, 1982).

These speculations must be evaluated empirically. There are no experimental research studies published in scientific journals that focus directly on group behavior in modern computer-mediated

communication, such as electronic mail. However, earlier studies of the teletypewriter lend support to the analyses we have presented. Sinaiko's (1963) experiments at the Institute for Defense Analyses indicated that "teletype quite dramatically depersonalizes negotiations. . . . Differences in initial positions held by negotiators converge more in a face-to-face situation, next by telephone and least when the teletypewriter is the medium of communication" (p. 18). Morley and Stephenson (1969, 1970) found that tasks requiring dependence on interpersonal or interparty considerations interacted strongly with media. Three studies that focused on group processes showed that role differentiation was diminished and more unstable in the computer-mediated cases. Moreover, frequency of participation was most equal in the teletypewriting mode, less equal with audio only, and least equal when subjects were face to face (Krueger, 1976; Strickland, Guild, Barefoot, & Patterson, 1975; Williams, 1975a). Communication by teletype was both "egalitarian" and "disorganized" (Williams, 1977).

The findings from research on earlier technologies indicate that computer-mediated communication raises some old issues. Technologies that lacked a distinctive etiquette (teletype, for instance) and/or the opportunity to exchange a full range of paralinguistic cues (such as freeze-frame videoconferencing) caused special problems for groups. In earlier advances of communication technology, people had to learn how to organize new and disparate pieces of information, and they had to learn how to behave toward one another.

Electronic communication differs from any other communication in time, space, speed, ease of use, fun, audience, and opportunity for feedback. For example, in one firm where someone posted a new product idea on the computer network, the proposition was sent in one minute to 300 colleagues in branches across the country, and, within two days, sufficient replies were received to launch a new long-distance joint project. We do not present this anecdote as though we know its precise significance, but we do mean to argue that computers are different from previous technologies. Research must discover how groups respond to the difference; how, given time, groups work out new communication traditions and rules; and what the requirements of the new communication culture will be. The answers to these questions ultimately will determine the nature of the social revolution embodied in modern communication technologies.

The rest of this article describes one approach to studying the social psychological dimensions of computer-mediated communication. In the following section, we summarize experiments on the effects on groups of simultaneous terminal-to-terminal tele-

conferencing and of electronic mail. Also, we have begun to study underlying processes and to explore questions of external generalizability. The final section summarizes the direction of this work.

## **Studies of Participation, Choice, and Interaction in Computer-Mediated Groups**

The purpose of our initial studies (Siegel, Dubrovsky, Kiesler, & McGuire, 1983) has been to explore, experimentally, the impact of computer-mediated communication, as used in our own local computer network, on group interaction and decisions. To our knowledge, these are among the first controlled experiments using modern, fast terminals and flexible computer conference and mail software (see also Hiltz, Johnson, & Turoff, 1982). We emphasized control over generalizability in the first three experiments, choosing a small group size of three. The subjects were students who had used the computer network previously. Also, we used a group task about which there is considerable knowledge, that is, the Stoner (1961) choice-dilemma problems (see, e.g., Dion, Baron, & Miller, 1978; Kogan & Wallach, 1964, 1967; Lamm & Kogan, 1970; Vinokur & Burnstein, 1974; Zajonc, 1969). This research was carried out in offices and rooms where terminals were already in use so as to duplicate the actual setting where communication typically takes place.

The first experiment is prototypical of the rest. The study compared three-person groups who were asked to reach consensus on a choice-dilemma problem in three different contexts: once face to face, once using the computer anonymously (i.e., not knowing by name who within their group was talking), and once using the computer nonanonymously. In the computer-mediated discussions, each person was separated physically from the others, and each used a computer terminal to communicate. Each group member typed his or her remarks into the computer using a program called "Converse," which divides the screen into three or more parts and allows messages from different people to appear simultaneously and scroll independently.

The main dependent variables in all of the experiments were (a) communication efficiency, (b) participation, (c) interpersonal behavior, and (d) group choice. We derived hypotheses for the experiments both from our observations of the technology and from the social psychological literature. We tried to examine whether computer communication is depersonalizing and lacking in social structure, and we tried to test our hunches about the implications. Hence, in the first experiment we predicted that participation would be more equal in the computer-mediated communication conditions. We thought that coming to consensus would be more difficult.

In carrying out pilot work, we had seen many instances of what appeared to be uninhibited behavior—subjects swearing, individuals shouting at their terminals, and groups refusing to make a group decision until a group member gave in—and as a result we systematically evaluated interpersonal interactions as revealed in the transcripts of both face-to-face and computer-mediated groups. We predicted more uninhibited behavior in computer-mediated groups. Also, we added an anonymous computer-mediated communication condition in order to explore whether not knowing specifically who was talking would increase depersonalization (e.g., Williams, Harkins, & Latane, 1981).

We hypothesized that choice shift would be greater when people used the computer, generally because norms are weaker and, hence, group members might be less likely to simply average initial opinions or obey the initial majority. According to social comparison theory (Brown, 1965; Goethals & Zanna, 1979; Sanders & Baron, 1977) and the persuasive arguments model (Vinokur & Burnstein, 1974, 1978), choice shift may occur in groups because people compare themselves to others with extreme or novel attitudes or because they are exposed to extreme arguments they would not otherwise hear (this assumes most people have moderate initial positions). If people in computer-mediated groups, as compared to face-to-face groups, are party to a broader distribution of opinions (because participation is spread more evenly across opinions) and extreme opinions are less likely to be withheld (because behavior is less inhibited), then we would predict more choice shift in computer-mediated groups.

Our data showed, in all three experiments, that computer-mediated communication had marked effects on communication efficiency, participation, interpersonal behavior, and decision making.

### ***Communication Efficiency***

Three measures bear on communication efficiency: time to decision, number of remarks exchanged, and percentage of discussion remarks about the group choice rather than about extraneous topics (e.g., school work). We found that in spite of the fact that messages arrived instantaneously, using a keyboard took time. Computer-mediated groups took longer to reach consensus than did face-to-face groups, and they exchanged fewer remarks in the time allowed them. We think groups in the computer-communication conditions took more time to reach consensus for reasons beyond technical difficulties. They might have had greater difficulties reaching agreement, judging by the vehemence of their arguments. Also, when we asked people to type out remarks that subjects had made face to face, we found typing

time could not account for all the time taken by computer-mediated groups to reach consensus.

We found that computer-mediated groups were as task oriented as face-to-face groups. This tends to rule out the idea that groups using the computer were inefficient because they were not paying attention to the task. In Figure 1, we summarize effects on equality of participation, group choice shift, and uninhibited interpersonal behavior.

### **Participation, Group Choice, and Interpersonal Behavior**

Based on analyses of who talked and how much they talked (i.e., the distribution of remarks among group members), group members using the computer participated more equally than they did when they

talked face to face. Although one person tended to dominate in both face-to-face and computer-mediated interaction, this dominance was less strong in computer-mediated groups.

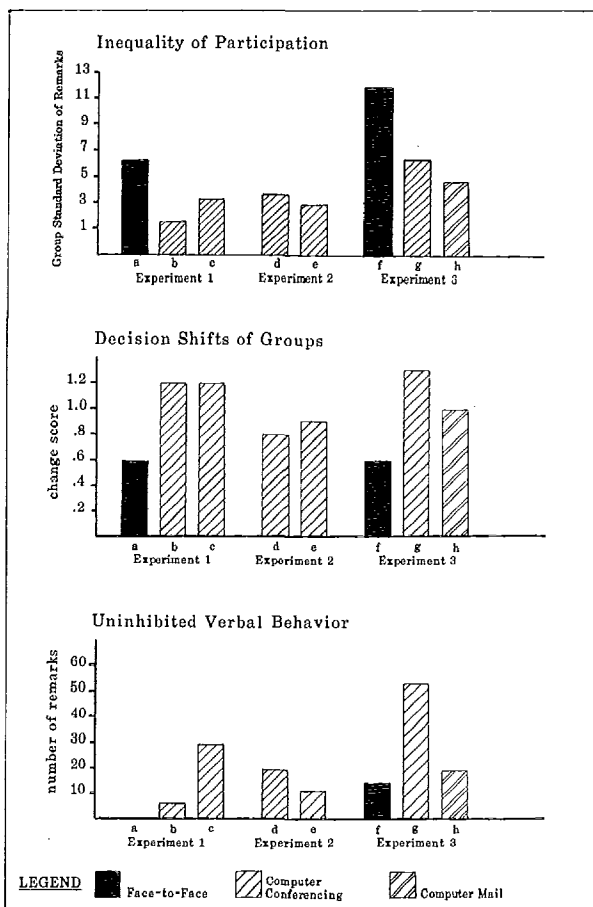
Computer-mediated groups showed significantly higher choice shift. We do not fully understand this finding. Analyses of the group process (e.g., extreme positions taken, use of decision rules such as majority rule or simple averaging, or repeated stating of positions) did not reveal differences in these processes between face-to-face and computer-mediated groups. People in computer-mediated groups used a higher proportion of numeric arguments, but this tendency was uncorrelated with choice shift. Perhaps if communication using the computer was depersonalized, people felt more able to abandon their previous positions or to ignore social pressure to reach consensus.

People in computer-mediated groups were more uninhibited than they were in face-to-face groups as measured by uninhibited verbal behavior, defined as frequency of remarks containing swearing, insults, name calling, and hostile comments.

In addition to what is shown in Figure 1, each experiment incorporated different computer communication design features and samples. By varying technical features of the communication programs and changing subject samples, we hoped to address some plausible alternative explanations of our results. Based on these variations we did reach certain conclusions. First, from using trained and practiced subjects in Experiment 2 (and adult managers in our fourth and fifth experiments), we concluded that our findings are generalizable to adults and nonstudents as well as to undergraduate students. Second, from comparing experienced and inexperienced computer network users, we concluded that our results apply not just to novices but also to people who use computers often and for whom electronic mail and message systems as well as simultaneous discussion systems are familiar. Third, we also have compared strangers and friends and obtained similar results.

Is computer-mediated communication simply disorderly, perhaps because there is no constraint on interruptions and distracting remarks? In Experiment 2, Vitaly Dubrovsky (Dubrovsky, Kiesler, & Siegel, 1983) devised a technical variation of the simultaneous computer conversation program to see whether imposing procedural order through technical features of the communication medium would increase its similarity to face-to-face communication. He designed a sequential computer conference program that forced group members to take turns speaking and to indicate to others when they wished to interrupt. Hence, the new software allowed only one person to talk at a time, and we compared how

**Figure 1**  
*Inequality of Participation, Decision Shifts of Groups, and Uninhibited Verbal Behavior*



Note. These three experiments had varying conditions; a and f = face-to-face conferencing; b, d, and g = simultaneous computer conferencing; c = simultaneous computer conferencing with subjects speaking anonymously; e = sequential computer conferencing; and h = computer mail. Adapted from Siegel, Dubrovsky, Kiesler, and McGuire (1983).



groups used this method with how they used the regular simultaneous computer conference program. The most important outcomes of this study were to establish that software developed to control the sequence of interaction is disliked and that it does not necessarily coordinate or control discussions. The effects of the computer-mediated communication programs were equal to those of computer communication in the first experiment.

Experiment 3 was intended primarily to extend the study to electronic mail, which is used extensively in most computer networks. Although electronic mail has some of the same cultural and technical characteristics as simultaneous computer conferences, it does not require communication in real time. There is time for reflection, for composing one's thoughts, and for side discussions with only part of a group. Hence, we thought it possible that electronic mail would be relatively conflict free and would produce about the same decisions as face-to-face communication. In spite of our expectations, the findings of Experiment 3 were similar to those of the other experiments. However, uninhibited behavior was somewhat higher in the computer conference condition than in the computer mail condition.

How might we explain the results as a whole? There are at least three alternatives, having to do with (a) difficulties of coordination from lack of informational feedback, (b) absence of social influence cues for controlling discussion, and (c) depersonalization from lack of nonverbal involvement and absence of norms. We will consider each briefly. First, we can explain the greater time people took to reach consensus and the evenness of participation rates by pointing to the absence of informational feedback between speakers and listeners in the computer-mediated communication condition. That is, the usual forms of discussion control through back-channel communications (Kraut et al., 1982) could not be exerted. People did not know exactly when their arguments were understood or agreed to, and consequently everyone believed they had to exert more effort to be understood. This explanation, however, does not account for the findings of greater choice shift and uninhibited behavior, except indirectly. Perhaps it was frustrating for people to be discussing a problem inefficiently; they might have become angry and, hence, more extreme in decision making and more uninhibited.

A second explanation of our findings is that in computer communication there is less influence and control of a dominant person, moderator, or leader. Lack of leadership could have caused difficulties in reaching a group decision efficiently. Without leadership, a group might ignore social norms, standards, and precedents, causing both choice shift and uninhibited behavior.

A final explanation for our results is that electronic communication involves a process of depersonalization or a redirection of attention away from one's audience. Suppose computer-mediated communication prevented personal feedback and individuating information and at the same time lacked a shared etiquette and, further, was influenced by norms from the computer subculture. This could have made group members more responsive to immediate textual cues, more impulsive and assertive, and less bound by precedents set by societal norms of how groups should come to consensus. This explanation fits our data. However, we emphasize that our own data do not provide any evidence to distinguish among these tentative and somewhat limited potential explanations.

Another issue with which we must deal is external validity, that is, to what degree our results can be generalized across people and technologies. Based on our own research and anecdotal evidence from reports of computer network behavior, we are relatively sure that our findings apply to a wide sample of both novice and experienced computer users. For example, observers of computer networks have noticed uninhibited behavior for years. In the computer subculture, the word *flaming* refers to the practice of expressing oneself more strongly on the computer than one would in other communication settings. The Defense Communications Agency, which manages the 12-year-old ARPANET, has had to police use of the network bulletin boards by manually screening messages every few days to weed out those deemed in bad taste. Nor is flaming confined to government-sponsored networks. When IBM installed the personal computer in offices and created an internal message system, VNET, to link them, a "GRIPENET" emerged—organized complaints against management practices and policies whose form and substance deviate considerably from standard IBM culture (Emmett, 1981). Of course, whether this behavior was caused specifically by a lack of shared etiquette, by computer culture norms, or by the impersonal and text-only form of communication is not clear.

We are not so sure how our findings would apply to more sophisticated technologies, say those that include video or audio channels in electronic mail. We suspect that combining telephone with electronic mail in the same facility would decrease the differences between electronic communication and face-to-face communication, if only because the amount of feedback is increased. Based on current trends, text-only electronic communication systems will become more popular. In that case, we should study both their transient effects (those likely to disappear when the technologies are mature) and their more permanent and secondary effects. Judging



from our own observations of existing networks, both kinds of change are important. For example, absence of computer etiquette is a transient problem, but it is one that raises significant policy debates over rights of computer users to privacy and freedom of exploration. A more permanent effect might be the extension of participation in group or organizational communication. This is important because it implies more shared information, more equality of influence, and, perhaps, a breakdown of social and organizational barriers.

## Implications for Future Research

The conceptual framework for studies of computer-mediated communication will develop mainly from studies of social process. These studies will provide either detailed descriptions of behavior or tests of alternative theoretical ideas. In our own laboratory, we have just collected additional data on the process of computer-mediated communication. In one new experiment, we asked business managers and university administrators to use simultaneous computer conferences to reach decisions involving multiattribute risky choices (Payne & Laughhunn, *in press*; Tversky & Kahneman, 1981). Preliminary analyses of the decisions and the content of discussions indicate that when the managers used the computer to consider the issues, they were less effective in considering all the issues and coordinating their discussion. The findings suggest that if computer-mediated communication is used by managers to make group decisions, those decisions may differ qualitatively from decisions reached face to face.

In another study (Kiesler, Zubrow, Moses, & Geller, 1983), we tested whether using a computer to communicate is physiologically arousing or has other affective consequences. In a  $2 \times 2$  design, we manipulated anxiety (anticipation of evaluation) and computer-mediated versus face-to-face communication in a study of how two people get to know each other. In this study, we measured physiological arousal (pore size and pulse), emotionality, interpersonal attraction, responsiveness to others, self-disclosure, and other aspects of interpersonal communication. Our results suggest that computer-mediated communication is not physiologically arousing. Once again we discovered more uninhibited behavior when people communicated using the computer. We also found that although people felt more embarrassed meeting one another face to face, they ended up liking each other better. Because other research suggests that gaze, smiling, and other nonverbal feedback is important to establish attraction (Scherer, 1974), our data do support our hypothesis that the lack of nonverbal involvement is a critical dimension of electronic communication.

Much more work on affective and cognitive dimensions of computer-mediated communication is needed to understand the issues we raised earlier. For example, further studies of affective responses may establish whether absorption in computer messages is arousing (see Zajonc, 1965), why users are sometimes aggressive (see Goldstein et al., 1975), whether attention is submerged in messages (see McArthur & Solomon, 1978), and under what conditions people will be uninhibited (see Zillman, Bryant, Cantor, & Day, 1975). The research could build on recent studies of affect in social cognition (e.g., Isen, Shaker, Clark, & Karp, 1978) that show how mood and emotion are connected to information processing, memory, and overt behavior using computers.

In addition to identifying behavioral dimensions of computer-mediated communications, research could reveal more about fundamental group processes, both inside and outside of computer-mediated settings. For example, social norms play a critical role in models of group decision making developed by Davis and his colleagues (e.g., Davis, 1973). According to these models, changing the potential for normative influence, such as reducing face-to-face contact, changes the influence function (Stasser & Davis, 1981, p. 544). Because computers appear to alter the operation of normative influences, studies of computer-mediated decision making might contribute to our understanding of these and other models in social psychology that invoke group pressure, persuasion, and affectively relevant processes.

The potential for developing important organizational applications from social psychological studies of computer-mediated communication is also high. One avenue of development will be experimental research that suggests new ways to use computers in education (Lepper, 1982), public affairs, and mental health. It might be possible to turn computer networks into social support networks. Second, it might be possible, through experimental research, to establish the feasibility of using electronic communication for surveys, questionnaires, and interactive polling. A group at our university is carrying out what we believe are among the first controlled experiments on using the computer to collect survey data (Kiesler & Sproull, 1984).

Finally, quasi-experimental and field studies of networks will suggest applications for long-distance collaborative work and management. For example, geographically dispersed groups of scientists and their students are currently working to develop a common computer language (Common LISP) for artificial intelligence research. The groups have used electronic mail via ARPANET with everyone participating rather than forming committees and meeting face to face (Maddox, 1982). Reportedly, electronic

mail was used during 1 year to discuss some 232 issues. About 150 of these issues were resolved before participants came to any face-to-face meeting. Most technical questions were resolved by someone in the group communicating a solution through the network. However, questions of style, for example, about programming conventions or systems architecture, evoked conflict and flaming on the computer. These matters had to be resolved by a mediator (appointed by the groups to organize the project) or in face-to-face meetings. Nonetheless, participants in the project report they have made more progress and acquired the active contribution of many more scientists by using the network. Their experience suggests that long-distance computer-mediated group problem solving could have many useful applications. Hiltz (1984) discussed many other instances of long-distance collaboration using the experimental Electronic Information Exchange System (EIES).

Although the social responses to computer-mediated communication described in this article occur in the situation in which the communication takes place, readers should not carry away the impression that all of the social implications are short term. Some effects, such as increased lateral communication in an organization or reduction in clerical staff, might develop over a long period through the actions and attitudes of many people (Hough & Panko, 1977). Others have examined organizational effects of computers generally (Boguslaw, 1981; Danziger, Dutton, Kling, & Kraemer, 1982; Whisler, 1970). Our aim has not been to delineate any particular social impact but to suggest, using our work as an example, the significance of understanding the broad range of social implications of computerization. Much of this work belongs in the field of social psychology, although the line between social psychology and other areas of psychology and social science is tenuous and arbitrary. Actually, studies of behavioral and social processes in computer-mediated communication (indeed of all computing) will be carried out best as an interdisciplinary effort.

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